JPRS-WST-84-007

21 February 1984

West Europe Report

SCIENCE AND TECHNOLOGY

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WEST EUROPE REPORT

SCIENCE AND TECHNOLOGY

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MICROELECTRONICS

SCIENTIFIC AND INDUSTRIAL POLICY

AEROSPACE

COSTS, PAYLOAD OF ARIANE, U.S. SPACE SHUTTLE COMPARED

Cologne DFVLR-NACHRICHTEN in German Nov 83 pp 33-36

[Article* by Prof Roger E. Lo, PhD, Institute for Chemical Drives and Technological Process of the DFVLR, Hardthausen am Kocher: "Performance and Costs of Ariane and the Space Shuttle in Transporting Satellites Into Geostationary Orbit"]

[Excerpts] About 5 years ago it was generally assumed that after the introduction of the reusable space-transporter space shuttle in the Space Transportation System (STS) in the United States and after the introduction of Ariane, the European transport rocket, commercial satellite transportation would soon be completely taken over by these two systems. The almost 2 years' delay in the first launch of the STS on 12 April 1981 had the consequence that the Ariane was in a very short time completely booked out for almost 30 launches (including options). Although the first Ariane was launched more or less on time on 24 December 1979, nevertheless in the sequel it was unable to make use of the available opportunity because of technical difficulties which arose. This has had the consequence that at the present time it is the systems listed in Table 1 [table not included] which are now available commercially for transporting communications satellites into geostationary orbits. To the extent that the upper stages (Inertial Upper Stage/IUS, Payload Assist Module/PAM, Centaur) do not enter into the geostationary orbit (GEO), it is necessary to employ additionally apogee boost engines (ABM) for transport out of the transfer orbit (Geostationary Transfer Orbit/GTO). Both Ariane and also Atlas-Centaur can be equipped with double launch devices (Sylda or Centaur Tandem Adapter) which will permit the simultaneous launching of two satellites of the Delta class (500 to 600 kg) as soon as the corresponding lower stages are equipped with solid fuel strapon boosters (Ariane 3 or Atlas 6). For all the listed carriers there exist designs or even solid plans for further expansion of their capacity, i.e., they will probably continue for some time to be competitors of STS and Ariane. In addition, it is possible that sometime in the near future further competition will emerge from state-national suppliers of transport capacity (like Japan with H-carriers, the USSR with the Proton, the People's Republic of China with the Long March) or such transport capacity may even be offered by private firms. Nevertheless, right now for the European useful load manufacturer the greatest interest attaches to a comparison of STS and Ariane.

* Shortened version of a lecture delivered at the "Satellites for Radio and Television" Symposium of the Hermann Oberth Society in September 1983 in Berlin.

Performance Capabilities of the Space Transportation System and Its Various Transfer Systems

The STS is designed only for a transport in a low earth orbit (Low Earth Orbit/LEO). The nominal useful load of 29.5 tons [metric] is only reached up to an orbit altitude of about 200 km; higher orbits require, with diminishing useful load, that additional propellant tanks be carried along for the propulsion system (OMS [Orbital Maneuvering System]).

The orbiter (Space Shuttle) of the STS is therefore fully equipped for the transport of transfer systems, including cryogenic, which must further convey certain payloads for GEO. The cargo space has a length of 18 meters and a useful diameter of 4.46 meters. At this length the average density of the cargo would have to amount to at least 200 kg/m^3 in order to fully use the payload capacity of the STS. But since communications satellites on the average weigh no more than 30 kg/m^3 the simultaneous stowage of large satellites and their transfer systems is very problematical.

Payloads of the Ariane Transport System

Ariane 4 will be available in six versions depending upon whether one employs no strapon booster or two to four solid boosters or liquid boosters; Table 4 lists the payload development.

Table 4. Payloads of the Ariane Series; the LEO values are computed values whose actual realization would presuppose structural changes in the third stage and in the adapter

Ariane		1	2	3	40	42P	44P	42L	44OP	44L
LEO	kg	4,000	4,600	5,300	5,300	5,900	6,800	7,200	8,300	9,400
GTO	kg	1,700	2,000	2,350	2,400	2,700	3,100	3,300	3,800	4,200
GEO	kg	900	1,100	1,350	1,400	1,600	1,800	1,900	2,200	2,500

At the present time it is possible to handle individual payloads up to a diameter of 3 meters and a height of 7.9 meters, or double launches can be carried out with the Sylda support structure. In Ariane 4 the usable diameter is enlarged to 3.65 meters; similarly an enlarged Spelda double launch structure having a diameter of 3.5 meters and a height of 3.5 or 4.4 meters is being developed.

The exact value of the GEO payload naturally depends upon the choice of the ABM. At the present time Ariane has available in the MAGE solid fuel power plants various options for relatively small satellites. The power plants must be integrated with the payload (Table 5). For all power plants there exists the possibility of an approximately 20-percent offloading. Its structural mass has the values conventional for solid fuel power plants (e.g., MAGE 2: 46 kg at a length of 1.52 meters; 0.77-meter diameter); the specific impulse is low (2,895 meters per second).

Table 5. European MAGE Solid Fuel Apogee Power Plants

MAGE		1	1s	2
GEO payload	kg	345-451	445- 553	552- 674
Thrust	kg	310-369	365- 448	440- 536
Corresponding propellant	kg	268-327	320- 403	390- 490
Maximum total impulse	kNs	945	1,167	1,407
Mass in GTO		655-820	810-1,001	992-1,210

Liquid Transfer Drives for STS and Ariane

Numerous transfer drives using liquid power plants have already been used. Their total impulse ranges from the 440 kNs of the German Symphonie ABM (1974, the first drive of that type) through two orders of magnitude up to the cryogenic Centaur-D1 with 59,100 kNs.

For the GEO transport which is exclusively considered in this present review the requirements of STS and Ariane differ evidently in the fact that the orbiter only flies in LEO mode and hence requires a perigee-apogee propulsion system (PAS) while Ariane flies in direct GTO mode and requires in addition only an ABM.

Transport Costs

The STS and the Titan 34 D cover the range of heavy geostationary payloads (requirement in the nineties presumably up to 5 tons).

As long as STS operates on the basis of subsidies the transport costs of Ariane 1 and 3 in the domain of the Delta and Atlas class satellites can be reached only through special pricing. After that, Ariane 4 will be able to compete in its various versions well up to the range which is very expensively covered by the STS/IUS system (the STS urgently needs a perigee-apogee system with liquid propellants).

The emergence of the Soviet Proton sometime after 1988, if it really comes off, could introduce serious competition into the international space transport market (think, for example, of Aeroflot).

In comparing costs one must also take into account the user's cost for insurance of the payload. It depends upon the demonstrated reliability of the carrier and amounts to between 7 and 20 percent of the value of the payload.

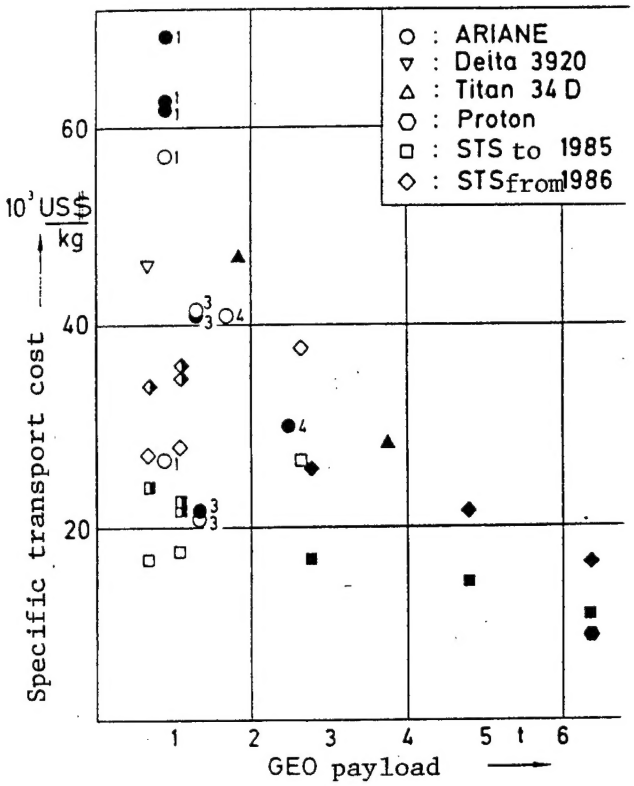

Fig. 3. Specific transport costs as a function of the size of the payload (the figures following Ariane symbols denote the model number; black symbols denote liquid transfer drives, white symbols solid fuel drives).

8008
CSO: 3698/251

AUTOMOBILE INDUSTRY

MERCEDES-BENZ AUTO 2000' ACHIEVES LOW DRAG COEFFICIENT

Wuerzburg AUTOMOBIL INDUSTRIE in German Sep 83 pp 379-385

[Article by Albert Hack and Ruediger Faul: "The Aerodynamics of the Mercedes-Benz Research Vehicle"; for related article see JPRS 83065, No 139 of this series dated 14 March 83 pp 43-47]

> [Excerpts] Air resistance is one of the major considerations in motor-vehicle design when it comes to manufacturing cars with reduced energy consumption and hence lower costs. Measures taken toward the reduction of fuel consumption, however, are in conflict with a large number of engineering requirements. Despite these difficulties, a drag coefficient of $c_D = 0.27$ has been achieved for the Daimler-Benz experimental car. This new car was created using some of the major bodywork components of the S Class Sedan which provided a good starting point with a c_D of 0.36. It might be noted in this context that this low drag coefficient was obtained without making any compromises in the sensitivity to side winds.

4. Aerodynamic Optimization of Model and Vehicle

In the aerodynamic design development of the research vehicle, in addition to the limitations cited above, the optimization potential was further reduced by the fact that important bodywork and assembly units had to be adopted from the Series 126 (see Figure 4) to ensure the required similarity within the line. This series already offered relatively advantageous starting conditions with highly significant c_D values of 0.36 for the Sedan and 0.34 for the Coupe.

In the course of a rather brief preoptimization phase on a 1:5 clay model (Figures 5, 6, and 7 show the flow pattern as a whole as well as the flow over the front and tail ends), the hatchback style rear end was developed; this has advantages, albeit slight ones, over similarly improved notchback and fastback designs.

Almost in parallel with these tests, a semi-clay model was constructed on an operable chassis; including a new front skirt likely to cause less injury

to pedestrians and a few adjustments to the tail end; this model corresponded to the Series 126 up to the belt line (see Figure 8).

A comparison of the contours in Figure 11 shows that in accordance with the requirement that research vehicles in the top class have room for up to five passengers and their luggage, a definite reduction in cross section was not possible; the only exception was the depression of the middle of the roof, done for formal and strength reasons, which admittedly reduced the front area slightly by about 5 percent, but at the same time, as it later turned out, increased the c_D value to approximately the same degree, so that there was no effective improvement in the F x c_D value.

The optimization efforts therefore had to be concentrated on the rear, the underside, and especially the trim. Using the semi-clay model described above, the first wind tunnel measurements were made in July 1979 in the original condition and produced a relatively favorable c_D value of 0.29 which was then further reduced to 0.254 by various measures. With a surcharge of about 18 percent to take into account the absence of surface trim as well as a cooling air fraction that was too small, the desired c_D value of 0.30 was achieved in the finished state. Optimization of detail such as guidance of the cooling air, outside mirrors, mudguards, cemented windshield, flush-fitted side panels, and smooth automotive wheel covers were critical to achieving this value, with which the vehicle was finally presented at IAA 1981 in Frankfurt. In addition, the height of the roof as originally provided could be raised in the rear seat area by about 10 mm without increasing the air resistance. A rear spoiler 10 mm high produced an additional slight improvement. In addition, the entire underside was shrouded; especially in the area of the underside of the trunk, the partial shrouding around the spare tire well, raised at the rear edge, had to be adjusted. In addition to molded deflecting elements in front of the rear wheels, steep wind-deflecting panels were provided covering the wheels down to the half-way mark.

When additional vehicles were finally available after the Frankfurt presentation, new detail optimization was carried out. In addition to avoiding partial shrouding of the underside, in which the expense had an unfavorable ratio to the advantages gained, an improved outside mirror (see Figure 11) and new wheel covers (see Figure 12) were developed; in the case of the latter in particular, extensive tests of the pressure and speed conditions were performed on the wheel to ensure not only smooth flow over the wheel but also sufficient ventilation of the brakes and wheels. Additionally improved sealing measures made it possible to achieve a coefficient of air resistance that was reduced 10 percent to $c_D = 0.27$ after the vehicle design was finalized. This meant an overall improvement of about 25 percent over the basic type and a definite difference from the values for current mass production vehicles.

The influence of the ground clearance on the c_D value was finally tested on the finished vehicle. Figure 15 (omitted) shows a linear relationship between the lowering of the vehicle and the reduction already possible in the vehicle (direct intervention is possible using the hydropneumatic system) by 40 mm relative to the initial level, a c_D value of about 0.25 was finally reached.

5. Aerodynamic Behavior under the Influence of Side Winds

As a rule aerodynamically improved vehicle designs react more strongly to side winds than do less streamlined boxy shapes. In reducing the air resistance, therefore, the designers of the research vehicle had to pay attention to other air force and air torque coefficients that influence driving stability and had to optimize them. A comparison with all of the values for different automobile designs, which we determined up to about 1981 from our own measurements, shows, in Figure 16, that the coefficients of the research vehicle were for the most part in the lower area of the individual scatter ranges.

Another comparison of the most important coefficients with the corresponding coefficients of the basic type in Series 126, which was rated as especially insensitive to side winds on the road, shows that the yawing moments in the investigated range of "diagonal onflows" of = ± 35° are nearly identical, so that the same yawing behavior can be expected; on the other hand, Figure 18 shows that the lift at the front axle in the research vehicle run about 25-30 percent less than in the basic type; the resultant decrease in front axle load relief produces a further improvement in ride stability.

6. Conclusions

A considerable reduction in air resistance to c_D = 0.27 has been achieved on the "A-2000" research vehicle, based on the Series 126, which offered relatively favorable starting conditions with a c_D value of 0.36; extensive optimization, especially in detail, was required for this achievement.

The experience gained in this development has already had favorable effects on series development, since some of the measures adopted have already been checked and modified and worked into the mass production vehicles. If we look at all the aerodynamic potential which has been realized, we can imagine air resistance conefficeints of a similar order of magnitude being used throughout the mass-produced vehicles in the near future.

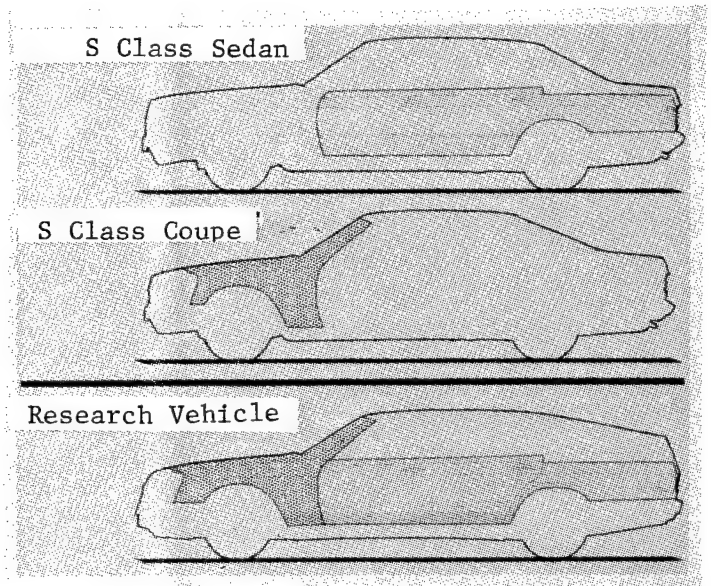

Bild 4
Karosserieaufbau Forschungspersonenwagen — Serienkomponenten und Neuteile

Figure 4.
Body design of experimental cars, mass-produced components and new components

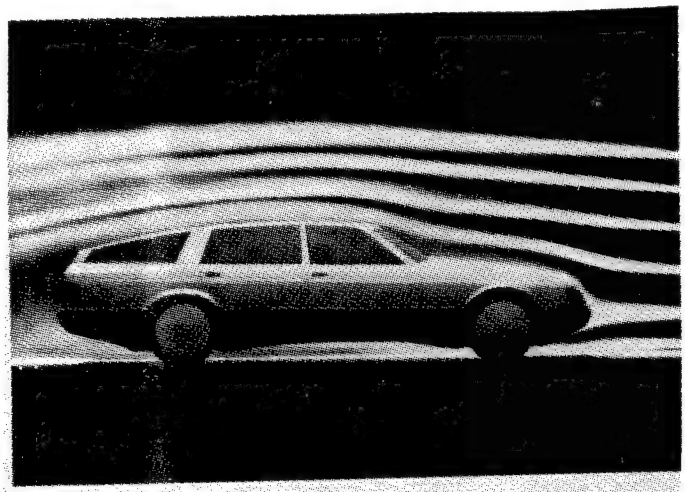

Bild 5
A 2000 — Gesamtumströmung 1 : 5 Modell
A 2000: — total air flow, 1 : 5 scale model
A 2000 — Solénation totale de la maquette à 1 : 5

Figure 5.
A 2000 - Total airflow over a 1:5 scale model

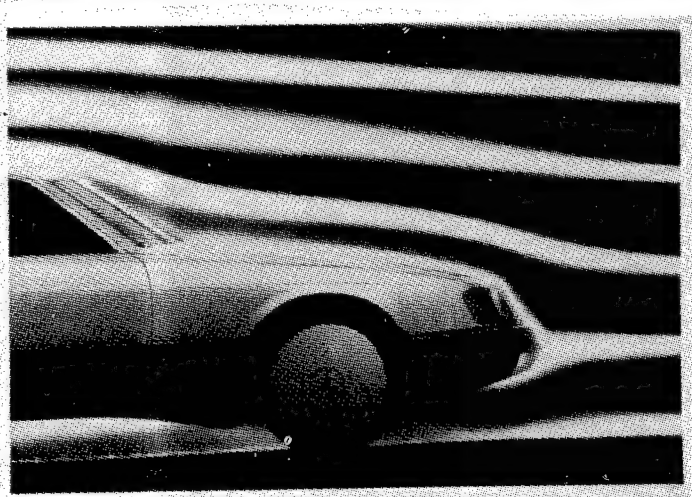

Bild 6
A 2000 — Bugumströmung 1 : 5 Modell

Figure 6.
A 2000 - Flow over front end in 1:5 scale model

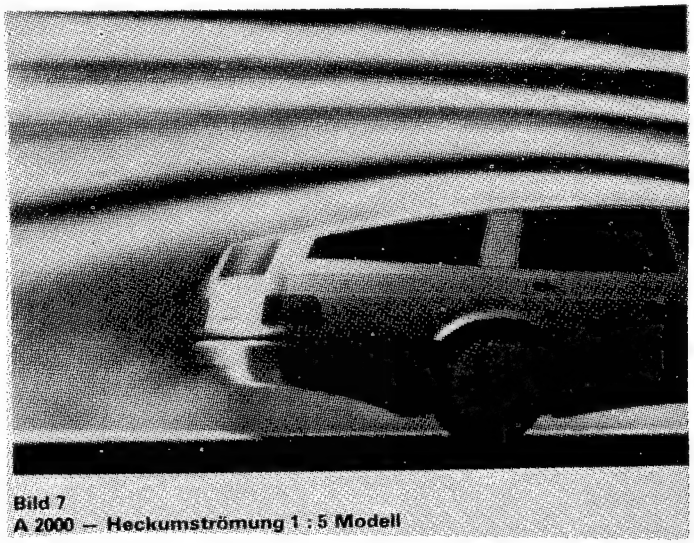

Figure 7: A 2000 - Flow over tail of 1:5 scale model

Figure 8: A 2000 - 1:1 semi-clay model

Figure 11: A 2000 - Aerodynamically improved outside mirror

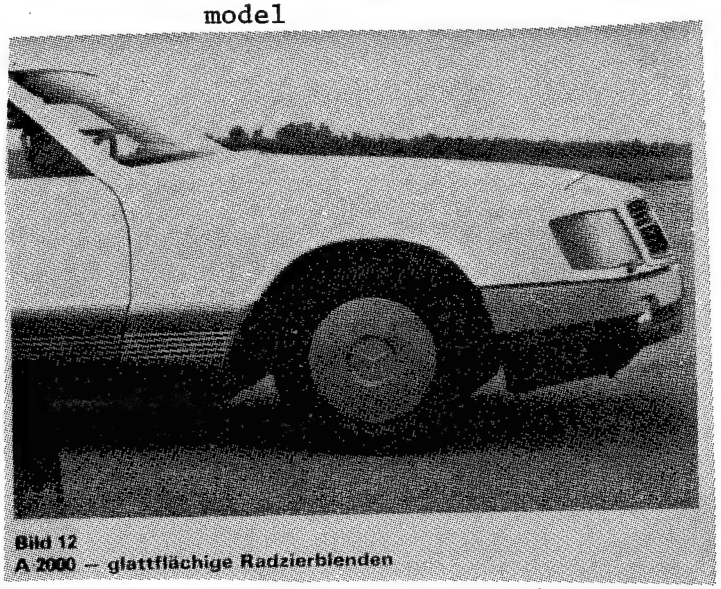

Figure 12: A 2000 - Smooth wheel covers

STATUS OF FRENCH RESEARCH IN PLASTIC BATTERIES

Paris L'USINE NOUVELLE in French Supplement to 15 Dec 83 Issue p 11

[Article by Philippe Douroux: "Plastic Batteries: The French Direction"]

> [Text] One advantage suffices to explain the interest shown by businessmen in the plastic battery: its weight can be divided by 4 and retain the same power. Furthermore, its watertight properties and recharging speed should win it the approval of automobile manufacturers.

Replacing the lead in today's batteries with doped plastic capable of returning the electrical energy previously stored is no longer the dream of researchers. Today, it has become the dream of businessmen and, first of all, of chemists. Whereas until today, the success of plastic materials has been based on their dielectric capabilities, new avenues are now open, based on their conductivity, and the electrochemical properties of polymers.

Discovered by Professors Marc Diarmid and Heeger from the University of Pennsylvania the electrical energy storage capability of polyacetylene has also opened new avenues of research in the areas of industrial or automobile batteries. For the last three years, businessmen have been rushing into the breach. BASF, in cooperation with Varta in Germany, Allied Corp and IBM in the U.S.A., the Shimbaura Institute of Technology in Tokyo and the European Batteries Company (CEAC), associated to the CEA in France, are all developing experimental cells which are the forerunners of tomorrow's batteries.

One advantage is enough to explain the interest shown the plastic battery by businessmen. "For a comparable production cost, it is reasonable to expect a power-to-mass ratio of 800 W/Kg, as opposed to 200 W/Kg for traditional batteries," observes Gerard Dalibard, technical director of CEAC-Fulmen-Tudor-Dinin. For the same power, the weight of a battery could be divided by 4.

After a late start compared to the Americans or the Japanese, CEAC, basing their activities on work carried out by CEA on conductors over the last 10 years, has picked a different avenue of research. BASF, Allied Corp, and the Japanese will start from the basic work of Marc Diarmid and Heeger on polyacetylene, which is particularly well adapted to slow discharge batteries powering computers and data processing systems. The race is underway between

slow discharge industrial batteries based on polyacetylene, and start-up batteries based on doped polymers.

"There are three reasons for our choice," explains Gerard Dalibard: "CEAC dominates the start-up battery market, CEA, on the other hand, seems to have already explored the polymers area, and finally, the expected weight saving, besides the other anticipated advantages (completely watertight, fast recharging rate: 2 hours, as opposed to 4 to 8 hours for traditional batteries), should help it win the support of automobile manufacturers, within the scope of the program to study vehicles with a fuel consumption of less than 3 liters per 100 km."

So when will the all plastic battery be available? Not before the 1990's. "Although it is true that we are at the present time progressing rapidly, without encountering tough problems, we should not underestimate the problems which will arise as we try to meet automobile manufacturers' specificiations, and especially to become economically competitive with traditional batteries," believes Gerard Dalibard.

At the moment, CEA and CEAC are pursuing their program by combining basic research and applied research in four areas: polymers, solvants, half-batteries, and the battery itself. They anticipate that they will have a 20 amp/hour experimental battery as early as 1984.

PHOTO CAPTIONS

Above: The 20 amp/hour experimental organic cell, a forerunner of tomorrow's battery.

Left: At CEAC, electrochemical tests are being performed on a three-centimeter diameter organic battery.

6445
CSO: 3698/234

PSA, RENAULT WORK ON 'ALL FUEL' AUTOMOBILE ENGINE

Paris L'USINE NOUVELLE in French 12 Jan 84 p 11

[Text] For several weeks the composition of replacement fuels has become standardized (less than 10 percent alcohol). The result is "carburol," a fuel which is completely compatible with traditional gasoline engines. But in order to use mixtures containing between 10 percent and 100 percent pure alcohol, it is necessary to design specialized engines. An "any mixture" engine capable of using any fuel from pure gasoline to 100 percent alcohol is the objective that the Scientific Group for Engines, an organization including the IFP (French Petroleum Institute) and the two French manufacturers PSA and Renault, has set for itself. The group decided to start with a traditional 2-liter displacement engine, and equip it with an electronic injection system which receives and processes data concerning the nature of the fuel. The principle selected consists in varying the air intake as a function of the alcohol contents of the mixture. In order to determine the percentage of alcohol in the mixture, three methods have been developed: detection of the titer by using the absorption properties of the optical radiation of the mixture, processing of the tank input data by magnetic card, and measurement of the richness of the intake fuel by a sensor installed in the exhaust. A prototype ignition system associated to the engine knock by a vibration sensor and to optimum combustion through ionization sensors has been used.

Another advantage of this "all-fuel" engine is in the fact that the electronic components used are almost all standard components. This engine works perfectly on the test bench and its operation has been rated as "satisfactory over a wide range of mixtures" by its inventors. From the economic standpoint, this engine could generate a high level of interest since it allows a completely free distribution system, with gasoline available in some cases, alcohol in others, and mixtures in still others. The user no longer has to select the type of fuel he needs.

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CSO: 3698/234

GERMAN RESEARCH FOCUSING ON NEW ANTIBIOTICS

Frankfurt/Main FRANKFURTER ZEITUNG/BLICK DURCH DIE WIRTSCHAFT in German 27 Dec 83 p 5

[Text] By now, about 5,000 antibiotics are known, of which about 150 are used in actual practice. Now as before, the search proceeds intensively because new applications are always found in addition to the actual antibiotic effect--thus in animal nutrition, in plant protection, in insecticides, in tumor treatment. The original objective--fighting living microbes--also requires new developments of antibiotics again and again because the microorganisms, which for some time have been "fought off" successfully, gradually develop a resistance and because "problem germs" still exist which cannot be successfully treated with previously known antibiotics.

The spectrum of possibilities is as yet far from exhausted: Up to now, the effective antibiotic materials that have established themselves in practice essentially come from a few groups of organisms. Penicillin and its variations as well as the new cephalosporin come from low fungi, a large number of other antibiotics come from bacteria. Within these groups, the search is still going on for other types of antibiotics, using ever new methods. But this pursuit is now also being extended to entirely new groups of organisms: A group with much promise appears to be the so-called "sliding bacteria". Research, at the "Society for Biotechnical Research" in Braunschweig-Völkenrode concentrates on this sector. Under the present management of Professor Dr. Hans Reichenbach and Dr. G. Höfle, remarkable progress has been achieved along the path towards new antibiotic materials.

In contrast to the majority of the remaining bacteria, which move about by means of flagella, these "sliding bacteria" move by sliding on a substrate which they have made "passable" by means of a secreted mucus. Even in the early days of antibiotic research, it was recognized that the sliding bacteria also exude antibacterially active substances, but they were not investigated more closely because their cultivation seemed too difficult. A single antibiotic from a "sliding" bacterial strain (lysobacter) became known in 1966, and is currently being used in plant medicine.

The GBF (Society for Biotechnical Research) in Braunschweig pursued this difficult but promising area of bacterial research beginning in 1975. In particular, work began on the large group of so-called "myxobacteria" (with no less than 40 different strains). These myxobacteria are forms with a social behavior that is unusual for bacteria: In times of poor living conditions, they get together and build up tree-shaped colonies. Here, protected by a leather-like outer skin, they wait in common for "better times". These "little trees" contain up to a million or more individuals, closed together in various "fruiting bodies" which, however, always remain isolated by themselves.

Today, one can cultivate these remarkable "social bacteria" in liquids without great difficulty. One can nourish them with corn gluten or also bacterial cells, if one keeps the concentration of phosphate salts low in the nutrient fluid (which otherwise are frequently used as a nutrient for cultures).

In the project of looking for antibiotics from sliding bacteria, altogether about 2500 different strains of numerous types have been investigated in Braunschweig, as regards their production of antibiotic substances. More than half of the strains are "myxobacteria", which exhibit a surprisingly high activity: About 40 to 60 per cent of the tested strains show antibiotic effects--a percentage that otherwise is scarcely reached by any previously investigated group of organisms. This confirms the importance of myxobacteria as a "target group" of the Braunschweig research. Another group of sliding bacteria, the "cytophages", proved antibiotic only by way of exception, however. When the effective substances were isolated and investigated in more detail, it generally appeared that they are "trivial substances" that have long been known in chemistry, by means of which these bacteria protect themselves chemically against biological enemies.

Already now--where the research is still in progress--15 active substances from the "screening" were researched in more detail ("screening" means "sifting" from a large number of potential useful antibiotic producers from the majority of bacterial strains). Of these 15 substances, 12 proved to be new natural substances which then were investigated in more detail. The activity and the "inventive richness" of the myxobacteria in the development of antibiotic defensive substances is distributed quite variably: Some of the new antibiotics are produced simultaneously by various strains or even types; on the other hand there are different strains of one type which form two or three antibiotics simultaneously.

This complex spectrum of the distribution of antibiotic production within the myxobacteria makes it difficult to isolate and identify the individual new materials. Furthermore, the production precisely of the most interesting materials was initially very low. Generally it amounted only to between 0.2 and 2 milligrams per cubic centimeter of culture solution. In the meantime, it has been possible, for the antibiotic producers which are primarily important for further research, to improve the holding conditions so that the yield is increased. Initially, the myxobacteria were difficult to handle, but now it has become possible to cause them to grow and to produce their effective materials in some strains, in the largest available "bioreactors" with a capacity up to 5 cubic meters. In particular, this can be done in technically conventional culture liquids, so that the path to future mass production is open.

Further improvements for the discovery and mass production of the new group of myxobacteria antibiotics are expected from current basic research concerning their chemical metabolism. Previously, this was unknown and therefore had to be researched from its foundations.

Some of the newly discovered substances exhibit "futuristic" properties: Thus the "myxopyronin" in a test experiment exhibits a strong inhibition of the growth of test bacteria. Just like the similar "corallopyronin", it interferes in the repro-

ductive mechanism of bacteria. Myxothiazol inhibits cell respiration with higher organisms (above the "level" of bacteria).

At this time, myxovirescin appears the most interesting. It acts quite specifically against bacteria and without toxic side effects. Its target bacteria are designated as "gram negative bacteria", such as the Tbc-exciters. It inhibits cell build-up by disturbances in the cell-wall structure. Since the cell walls of bacteria are constructed differently than with higher organisms, this myxovirescin is not hazardous for the higher organisms. There are at most four or five comparable antibiotics within the spectrum of previously known materials.

The further development of this interesting new discovery, however, is afflicted with difficulties: The problem of low productivity in the culture has in the meantime been solved in principle--although only after one found a mutated form which is insensitive to the antibiotic generated by itself. The strains delivering this myxovirescin initially proved so sensitive that, in a concentration of their own substance amounting to 0.12 milligram per cubic centimeter, their growth was decidedly restricted. Therefore one first had to grow "resistant" strains in order to achieve economically interesting production quantities. Today the possible yield of 0.25 milligrams per cubic centimeter has been increased 160-fold, to more than 40 milligrams. Their high effectiveness against "gram negative" bacteria is only achieved in laboratory tests. When they are used against living bacteria cultures, the reaction is inhibited by side effects. However, in Braunschweig one also hopes to be able to overcome this difficulty. Thus, at this time, myxovirescin is the most promising candidate for an initial application of the pursuit of new antibiotics in the GBF. Of course, even after the last obstacles have been overcome, practical introduction will still take years, as experience shows, until the production and application methods as well as the market chances have been adequately clarified.

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INTERNATIONAL COMPETITION FOSTERS INTERFERON RESEARCH

Duesseldorf CHEMISCHE INDUSTRIE in German Dec 83 pp 730-732

/Article by Dipl. Chem. Adalbert Budzinski/

/Text/ Is interferon a drug looking for a sickness? Surely this would denigrate too drastically the hopes of therapeutic applications of interferon. Three years ago, the mass media still often enough praised interferon as a "wonder drug" against cancer, but now the euphoria has vanished. The enterprises that are most deeply engaged in this area confirm that test results with alpha-interferon did not fulfill the - initially high-pitched - expectations in the treatment of more common cancers. But the pharmaceutical enterprises doing research in this sector have gained experience which in the future should make it possible to produce economically many numerous valuable substances.

Probably with no other drug in recent times were hopes so great both with scientists and patients. There was worldwide rumor concerning the wonderful power of interferon against all possible diseases, especially cancer, and concerning its exorbitant production costs. Talk was set ablaze not least of all by sometimes very specific reports from smaller interferon companies, enhanced by false market forecasts from some marketing researchers, as regards the possible marketing potential. Pharmaceutical enterprises that occupy a leading position in this area recently confirmed that clinical tests with alpha-interferon in the area of more common cancers (solid tumors) did not fulfill expectations and furthermore indicated a series of unpleasant side effects.

Scientific Advance Makes Possible Economic Production

In a series of experiment which were performed in London in 1956, the Englishman Dr. Alex Isaacs, together with his Swiss colleague Dr. Jean Lindenmann, and independently of these Y. Nagano and Y. Kojima from Tokyo, could detect a substance which offered protection against virus infections. In their report, published in 1957, the two virologists called this substance "interferon", precisely because it evidently

interfered with the manner in which viruses propagate. The scientists further reported that this substance was supposedly effective against a series of viruses, a phenomenon which previously had never yet been observed.

But only small progress was achieved for several years, because interferon could be produced only in small quantities. Many people even doubted the existence of this substance. The situation only changed when Dr. Kari Cantell of the Finnish Red Cross developed a production technique by means of which alpha-interferon could be produced from human blood. He gathered sufficient blood from the blood donors of the Finnish blood banks to obtain from this interferon for clinical purposes during the seventies. But this process was complicated and expensive; white blood corpuscles (leukocytes) from blood donors who were infected with a virus, and the interferon liberated thereby, was collected and purified. By means of this technique, only ½ gram of partially purified interferon could be obtained, and this required more than 50,000 liters blood plasma. Although medicine exhibited great interest in interferon, research had to be put on a low burner because of the extremely small quantities, until finally the genetic-engineering method was discovered.

Only after the expression of the interferon gene by Dr. Charles Weissmann and co-workers of Zurich University as well as the successful synthesis of this protein in coli bacteria, did its properties also become known. In a few months, more knowledge concerning the biochemistry of the interferons was gathered in the previous 23 years.

Today, scientists know the precise chemical structure of various interferons. By growing bacteria in ferments and by subsequent laborious purification of the protein, large quantities can be produced relatively cheaply. The treatment costs for cancer patients thus could be reduced from 1,000 pounds to about 30 pounds per day.

Intense Competition for Market Introduction

Worldwide, about 50 businesses are concerned with interferon research; many of these are venture-capital companies. Schering-Plough Corporation and Roche Laboratories Inc. compete most intensively for first introduction into the U.S. market. Both currently emphasize alpha-interferon. Critical tests already began in 1981. At. Schering-Plough, the effectiveness of the substance was checked in numerous indication areas, among these multiple myelomas, malignant melanomas, kidney cancer, various lymphomas, leukemia, stomach, brain, liver, bladder, and prostate cancer. A few virus diseases such as e.g. the infection of the respiratory tract, genital herpes, hepatitis, as well as herpes zoster, and a series of other diseases, among them multiple sclerosis and skin diseases, are being or have been investigated by Schering. Schering expects to have adequate data by the end of 1983 to apply for approval in several countries for two cancer indications as well as for common cold prophylaxis. It hopes to market the first

β-interferon product against cancer in 1984. The U.S. pharmaceutical enterprise is continuing the 100 million dollar investment program by means of which an alpha-interferon factory is being constructed in Ireland, despite the somewhat reduced expectations. (Schering-Plough: "If only 10 percent of common cold sufferers can use interferon, it will have been worthwhile.")

The Basl Company Hoffmann-La Roche has slightly changed the priority of its interferon research objectives (in favor of monoclonal antibodies), but is working in this area with gusto. After it turned out that alpha-interferon is not very effective against solid tumors, more effort is now being put into investigating to what extent that active substance can be used against virus diseases. Secondly, the effect of the drug against non-solid tumors is being tested, since there are some encouraging results. Another research objective is the battle against solid tumors in combination with other, classical cancer treatment methods.

Other interferons, all of which can exhibit a different action spectrum, have partly already been tested or will be tested clinically soon. During the course of 1984/85, Roche wants to submit approval documentation in the U.S.A., Japan, and some European countries. For the product groups of interferons, retinoides, and traditional cytostatica, Roche developed a common strategy of cancer treatment, which includes the development of monoclonal antibodies.

Advanced Research Also in the Federal Republic

The internationally supported biotechnology enterprise "Biogen NV" called the first critical experiments with gamma-interferon on cancer patients a milestone in interferon history. This gamma-interferon was produced by means of the recombinant DNA technique. The experiments were published in September. At Biogen, which licenses interferon to Schering, and at Schering itself beta-interferon is currently under development. The Boehring Ingelheim subsidiary "Dr. Karl Thomae GmbH" is currently processing alpha-interferon from Namalwa cells, recombined alpha-2-interferon, and recombined alpha-interferon (in accord with a license from "Genentech Inc."), both from E. coli. Clinical tests of Phases I/II with alpha-interferon against herpes keratitis have been concluded. Clinical tests of alpha-2-interferon against viral infection and cancer have just begun. Beginning in January 1984, Thomae wants to test the action of gamma-interferon against viral infections and cancer. In Austria, alpha-interferon has already been approved against herpes keratitis, for the two others approval documents will be submitted in various countries during the course of the next years. Market introduction is planned for 1984/85.

The fact is noteworthy that the German "Dr. Rentschler Drugs GmbH & Co." was worldwide the first enterprise to market an interferon (against herpes zoster).

Corporations and institutes which are active in the area of interferons (the most important are emphasized by italics). Corporations active in several countries are mentioned only once. Status as of the beginning of 1983.

(1) Belgien	Rega-Institut
	Universität Gent
(2) Finnland	Central Public Health Laboratory
Frankreich	Institut Curie
	Institut Pasteur
(3)	Université de Montpellier
	Rhône-Poulenc SA
	Roussel-Uclaf SA
	Synthélabo SA
Israel	Interpharm Laboratories Ltd
	Inter-Yeda Co Ltd
	Yeda Research and Development Co
	The Weizmann Institute of Science
(4) Italien	Farmitalia Carlo Erba SpA
	Serono SpA
Japan	Ajinomoto Co Ltd
	Chiba University
	Green Cross Corp.
	Hayashibara Biochem. Lab. Inc.
	Japanese Foundation for Cancer Research
	Kitazato University
	Kyowa Hakko Kogyo Co Ltd
	Meiji Seika Kaisha Co Ltd
	Mitsubishi Chem. Ind. Co Ltd
	Mochida Pharmaceutical Co Ltd
	Otsuka Pharmaceutical Co Ltd
	Sumitomo Chemical Co Ltd
	Sunstar & Co Ltd.
	Takeda Chem. Industries Co Ltd
	Toray Industries Co Inc.
Holland	Holländisches Rotes Kreuz
Spanien (5)	Laboratorios Alter SA/Instituto Llorente
Schweden	KabiGen AB
(6)	Karolinska Institut
Schweiz	*F. Hoffmann-La Roche & Co AG*
(7)	*Biogen NV*
	Ciba-Geigy AG
	Institut für Molekularbiologie
	(ETH Zürich)

(8) Groß-	Animal Virus Research Institute
britannien	Beecham Group Ltd
	Celltech Ltd
	Chester Beatty Research Institut
	ICI PLC
	Wellcome Foundation
USA	*Abbott Laboratories*
	Applied Molecular Genetics Inc.
	Associated Biomedic Systems Inc.
	Bethesda Research Labs. Inc.
	Bionetics Inc.
	Bristol Myers Corp.
	Burns-Biotec Inc.
	Calbiochem-Behring, Inc.
	Cetus Corp.
	Collaborative Genetics Inc.
	DNA Science Ltd
	DuPont Corp.
	Enzo Biochem Inc.
	Flow Laboratories Companies
	Genentech Inc.
	Genex Corp.
	Interferon Sciences Inc.
	Key Interferon Corp.
	Life Sciences Inc.
	Meloy Laboratories Inc.
	Neo-Bionics Inc.
	Schering-Plough Corp.
	G. D. Searle & Co
	Syntex Corp.
	Viragen Inc.
	Warner-Lambert Inc.
(9) Bundes-	*Boehringer Ingelheim KG*
republik	*Dr. Rentschler Arzneimittel GmbH & Co*
Deutschland	*Hoechst AG (Behringwerke)*
	Institut für Humangenetik
	(Universität München)

Key:
1. Belgium
2. Finland
3. France
4. Italy
5. Spain
6. Sweden
7. Switzerland
8. Great Britain
9. Federal Republic of Germany

An expansive clinical program is in progess at the British "Wellcome Foundation". It concerns a highly pure mixture of alpha-interferons and was already started in 1980. Hundreds of patients in England, Canada, and Japan were treated for cancer or virus infections, with varying results. With a few types of cancer together with solid tumors and lymphomas, results up to now have been satisfactory, with a few others not so. The enterprise designates the action with virus infections and some virus tumors as "excellent". Schering-Plough and Roche are estimated to have expended 40 million dollars each for interferon research in 1983.

Interferon as Prototype

Among the numerous companies which are active in the interferon area, only a few will be able to show significant market success. Because not only production itself but the subsequent operations - isolation, purification, but especially clinical testing programs, and this separately for each type of interferon - are extremely expensive. But even more important than short-term bottom-line market success, is the know-how that one has obtained from interferon research. The substance serves, so to speak, as a model for the development and production of a series of body hormones. Among these belong e.g. the protein interleukin-II, which appears to be helpful against AIDS, and which is being studied by the Japanese Takeda, Biogen, and other laboratories. Adequate quantities were already produced so that clinical studies can begin soon. Other substances should follow soon.

Research in the Interferon area has still another advantage: Because of the attraction of the topic of a cancer cure, science has engaged in bio- and gene technology and has initiated a conceptual conversion among chemists, who now increasingly work on information from modern biology. In modern bio- and gene technology, interaction between these two disciplines appears most clearly. It leads to the development of new techniques in product isolation - one need only mention the separations which are based on monoclonal antibodies, immunoaffinity chromatography, or membrane technology. It thus "infects" numerous enterprises of the supplier branches.

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SWISS SOCIETY PROMOTES MICROBIOLOGY, BIOENERGY

Solothurn CHEMISCHE RUNDSCHAU in German 21 Dec 83 pp 10-11

/Article by A. Fiechter, J. Nicolet, and J. NÜesch/

/Text/ According to its statutes, the Swiss Society for Microbiology (SGM) is the scientific-technical society for microbiologists in Switzerland. Its charter is to promote contact among the members and development of the discipline. The SGM represents Switzerland in the relevant international associations and works together with other scientific societies in Switzerland.

The Society was founded in 1942 by the microbiologists in Lausanne who were assigned to the army. The military requirements of Switzerland made it necessary to create a special service during active duty, which today bears the name "B-Service", and which stands for an idea to many colleagues with military duty. Today the Association has 600 members who are active in various areas of microbiology. Accordingly, the activity in the Society has greatly changed. The following presentation shall describe this activity and thus will also make apparent some transformations which the area of microbiology has undergone.

The SGM has perceived its tasks here. It represents an important area of biology as a member of the newly founded Swiss Academy of Technical Sciences (SATW), is represented in the Swiss Society for Natural Research (SNG) and is an associated member of the Union of the Swiss Society for Experimental Biology (USGEB). Through membership in these umbrella organizations, it is able to promote the applications of microbiology to an extent that scientific societies cannot always do. As experience shows, this is the real strength of the SGM, which therefore is able not only to promote medical microbiology and hygiene but also to exert a decisive stimulus on industrial microbiology.

On the international level, the Society is represented in several organizations, for instance the European Federation of Biotechnology (EFB), the Union of Microbiological Societies (IUMS), the International Committee of

Economy and Applied Microbiology (ICEAM), and it provided the president and the secretariat for the Federation of European Societies of Microbiology (FEMS) during the last period of tenure.

The Facilities of the Society

According to its statutes, the organs of the society are the general assembly, the board, the comptrollers, and the committees. The board is composed of the president, the bursar, and four associates. The president represents the society externally and leads the administrative session at the annual general assembly. In a yearly cycle, one associate always officiates as the president of the scientific meeting. As a whole, the board is responsible for the concerns of the society. It makes proposals to the general assembly regarding the manifold activities, receives proposals from the ranks of the members, and executes the mandates assigned to it by the general assembly. Since 1976, the SGM also awards a funding prize. As a rule, this is awarded annually and should serve as an incentive for younger (up to 35 years) microbiologists who have done significant work in Switzerland or abroad as Swiss citizens.

The committees of the society have proven to be an extraordinarily effective tool. In most cases, the board implements through these committees the tasks that have been entrusted to it by the general assembly. Although special means (annual dues, contributions from the Swiss scientific umbrella organizations, etc.) are available for the manifold activities within a modest frame, these activities can essentially be implemented only thanks to the voluntary participation of many members.

The annual meeting is an essential institution of the SGM. In its scientific program, it treats current topics in medical and nonmedical areas. From the rich programs of recent times, the following topics can be cited by way of example:

Solothurn 1982
Medical implications of biotechnology
Study of hospital infections
Rabies, virology, and therapy
Monoclonal antibodies
Interferons from mammal cells

Freiburg 1983
Mycoplasmas - Procaryotes with special properties
Diagnostics of human clamydioses
Spiroplasmas - pathogenic mycoplasmas of plants and insects
Environmental microbiology
Foodstuff microbiology

Lugano 1984
The draft envisions a program concerning the implications of microbiology in the environment and will deal with areas of medicine, water/wastewater hygiene, and foodstuff microbiology.

These brief data show the endeavor of the SGM to provide its members an offering from which they can draw useful information for their daily work and to keep them updated concerning current developments.

Present Position and Activity

The explosive development of microbiology and the occurrence of various, sometimes highly specialized technical areas have not simplified the task of the SGM. But this situation solidified the identity of the technical society and stimulated it to formulate its objective precisely and to adapt its structure to its requirements. As main instrument of the society's activity, the committees and expert teams are at work for various technical areas. For all questions of microbiology in science and for the public they exercise a clarifying consultative and coordinating function. This activity is newly specified for every period of official duty and thus must be adapted continuously to current problems. Members of the society make themselves available without fee for such tasks. To guarantee the unity of the various technical directions, special stress is place on interdisciplinary contacts. This possibility manifests itself in the course of the annual meeting through the organization of principal lectures concerning current problems of general interest and seminars in various disciplines as well as through publications of an internal society information bulletin.

Activity in the Medical Area

Technical Consultation

An important task of the SGM in recent years was to work out requirements for the responsible managers of medical-microbiological-serological laboratories. Furthermore, great weight was ascribed to consultations regarding questions of disinfectants, in collaboration with the Federal Office of Health. Upon request from official agencies, the society regularly takes positions on drafts of revisions of legal prescriptions. These commentaries are worked out by specialists of the relevant technical areas. Furthermore, experts for expert opinions are also drawn upon in recognition questions.

Continuing Education

The SGM sponsers continuing education in general and feels responsible for continuing education in the area of medical analysis, especially in view of the rapid methodological development and of new disease-causing agents, which are found again and again.

University institutes and other officially recognized laboratories organize continuing education courses in various areas. On the average, two courses per year are given, which find broad appeal.

Standardization

The unexceptionable processing of the clinical material in a bacteriological laboratory is a decisive factor for a precise diagnosis and a correct interpretation. For this purpose, minimal technical requirements are necessary. A committee of the SGM has for some years been concerned with the standardization of serological methods. Its activity has led to the standardization of antibiotic sensitivity tests and recently to the development of a quality control for bacteriological investigations. In the near future, the latter will be offered by the SGM as a service. In the area of disinfectants, standardized methods were worked out for testing and evaluation. In connection with the simplification of diagnostic methods in bacteriology and virology, teams of specialists worked out guidelines and recommendations which will be published soon.

Publications

Within the framework of the committee activity, information suitable for publication is being gathered. There was much demand for brochures about the evaluation and control of disinfectants and disinfection methods, brochures which were published by the society. In collaboration with the B-service of the army, an epidemiological study was performed concerning the spread of bacterial resistance in Switzerland; the results were published in a medical journal.

Committee Activity in the Nonmedical Area

The nonmedical area has become considerably more important during the last 20 years. In fact, nonmedical personnel are now strongly represented among the members. The society offers adequate support to them too, in professional and technical areas. At the present time, three technical committees are working on very current topics.

Foodstuff Hygiene

Mass nutrition and industrial-commercial processing of agricultural products have caused hygienic control to become a significant component in the production and preparation of foodstuffs.

The committee for foodstuff hygiene takes care of efficient collaboration within the numerous active organs in this area and supports the measures of agencies and associations for the quality control of foodstuffs from animal and plant origins. Thus the society can make a contribution towards improving the training of the technical perople in this area. At the annual scientific meeting, a portion of the program is always dedicated to these important applications.

Bioenergy

General biology has developed strongly during the seventies in areas which previously represented marginal areas for specialists. The SGM has recognized this situation and in 1980 it founded a committee for bioenergy which is concerned with the promotion of ecology and bioenergy. Small meetings are held annually concerning progress in the area of biogas. In 1982, a very successful course was given in microbial ecology.

By including anerobic forms, the activity area of this committee has been expanded.

Biotechnology

This committee supports the members of the society in those concerns which have to do with the industrial application of microbes. It was called to life only in 1982, after it appeared that the other numerous organizations in Switzerland sought a discussion partner in the SGM. Through this committee, the society can now collaborate in the Swiss Coordination Board for Biotechnology (SKB), and can treat the current area of biotechnology at the proper time within the framework of the annual scientific meetings.

The committee has concerned itself especially with continuing education because there is a great need here. Currently it is involved in providing suitable courses at Swiss colleges.

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FRANCE TO PROMOTE INDUSTRIAL AUTOMATION WITH NEW PROGRAM

Duesseldorf VDI NACHRICHTEN in German 6 Jan 84 p 7

[Text] The French government wants to promote the use of modern automation systems in production with the help of a 3-year promotion program. The objectives here are the modernization of production-engineering systems, the development of the national automation industry, personnel training, as well as increased research in this sector.

A research program on the application of electronics in production--as happened several weeks ago in the FRG--has been announced in France. The 3-year project consists of four main points. The first main point involves the modernization of the production-engineering industry which in France encompasses about 24,000 enterprises with 2.3 million employees. Enterprises determined to modernize accordingly can get special aid in terms of financing and amortization for the procurement of automation systems. At the same time, the establishment of testing stations is being promoted by the government. The establishment of about 5,000 such testing stations ("diagnostics") is planned for the coming 3 years.

A second main point consists of the increased support for French producers of automation systems who are thus supposed to be able to prevail better against foreign competition, especially from the United States and Japan. Here, the French government makes corresponding commercial funds available and is planning another 250 pilot projects which will primarily be geared toward small and medium enterprises.

The training of suitable skilled personnel is the French promotion program's third goal. The French Education Ministry in this connection decided, from the current year onward and until 1986, to create the corresponding framework in order annually to train 300 technicians and 200 engineers for the automatic production sector and 3,000 technicians and 1,500 engineers for the practical application industry. Research in industrial enterprises--and this is the program's fourth main point--is to be supported through loans.

With the help of the approved research program, the French government wants to catch up in the automation sector. According to an OECD study, France

presently only has 1.9 robots for every 10,000 workers. In the FRG on the other hand, the figure is 4.3, in Japan it is 13, and in Sweden it is as high as 30.

When it comes to supplying the domestic market, the French automation industry still reveals considerable shortcomings. An exception here is the sector of storage-programmable controls, where the Telemechanique Crouzet and Merlin Gerin enterprises meet about 96 percent of the domestic requirements. According to a study by the BIPE (Economic Information and Forecasting Bureau), which has investigated the worldwide automation market, French producers only supply about 30 percent of the national computer market for industrial applications. In the case of numerical controls, they supply 56 percent, in regulation systems they provide 29 percent, in computer-based development systems they only provide 13 percent, and in the case of robots, at any rate, they meet 63 percent of the domestic requirements. The French market for automation equipment--in 1982 it was about DM1.6 billion--according to this study is expected to grow faster than the world market (around DM30.5 billion in 1982). The BIPE study here predicts an annual growth rate of 24.4 percent by 1990. On the other hand, the worldwide increase during the same period of time is to be around 24 percent, with 23.8 percent for the American market, 23.6 percent for the European market, and 22.1 percent for the Japanese market.

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FACTORY AUTOMATION

FRG INVESTS DM20 MILLION IN MATERIALS HANDLING RESEARCH

Duesseldorf VDI NACHRICHTEN in German 16 Dec 83 p 11

> [Text] An attempt is to be made at universities through the IMS (Integrated Material Flow System) to give German research innovative impulses in the material handling sector in order to respond to an international challenge. The research objective of the DM-20-million project is the development of special automats which--by means of computer-controlled detection of the basic functions "transporting, transloading/handling and storage"--can be flexibly integrated individually in the plant environment either individually or in combination. A significant contribution to this effort calls for very broad and flexible research activities and considerable financial expenditures.

The Machine-building Department of the University of Dortmund, with the Chair of Conveyor and Storage Systems acting as project manager (Professor Dr-Engineer R. Juenemann), in cooperation with the Fraunhofer ITW (Transportation Engineering and Goods Distribution Institute) and institutes at other universities is planning a major research and development program on the topic "Development of Integrated Material Flow Systems for Priority Use in Small and Medium Enterprises."

The project and the erection of the necessary development center is coordinated by the Dortmund ITW acting as project manager. The individual research subprograms are in each case carried out under the responsibility of the best suited institutes and technical fields. The IMS program is so designed that the further development of the component sectors of material flow automation will be promoted with enterprise automation.

The project is intended considerably to advance research transfer from the universities and the ITW to industry through cooperation with industrial firms, especially those from North Rhine-Westphalia. The individual research subprojects center around the development of new production lines which industry is then to market. The research project as such is currently being prepared in a study by the BMFT (Federal Ministry of Research and Technology) which has been underway since the middle of the year.

The entire project can be subdivided into three parts:

Erection of a planning and simulation service center with the objective of developing and testing computer-based aids for planning and operation of logistic systems and to make them available to all potential users.

Erection of a development center for internal enterprise material flow and assembly systems as well as transportation and traffic systems with the objective of developing, testing, and introducing into industry new transportation and handling automats.

Erection of a development center for goods distribution to develop storage and removal, consignment, and transloading automats in order to introduce innovations in this field likewise in industry.

The volume to be handled has been estimated at DM20 million over the next 4 years. The necessary investments come to about DM8 million. The participants start with the assumption that, overall, three points must be provided in order to translate this undertaking into action: The combination of research installations and enterprises into a research team; the centralization of research activities in a development center; and the fleshing-out of results obtained through the buildup of pilot and demonstration systems in the context of a consultation center.

5058
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ROBOT USE IN FRG INCREASES BUT SENSOR TECHNOLOGY LAGS

Duesseldorf VDI NACHRICHTEN in German 6 Jan 84 p 1

[Text] At the end of 1983, 4,800 industrial robots were installed in the FRG, so far the greatest rate of increase because in 1982 there were just about 3,500 units while in 1977, by the way, there were only 540. Japan further improved its leading position; the increase from 5,000 to a currently estimated 17,000 robots alone is just as great as the total utilization volume in the FRG. According to a report by the Stuttgart Fraunhofer Institute for Production Engineering and Automation, the greatest relative increase was recorded in the assembly field. "But this has been expected for many years," said Dr-Engineer M. Schweizer, a director at this IPA [Institute for Production Engineering]. So long as the periphery problems have not been solved, he felt, an explosion in the assembly work sector is really impossible. This also eliminates a threat to the many jobs for women in the electrical and electronics industry, in the short run.

In the assembly field, the expansion effort still fails because of the absence of sensors such as, for example, in casting cleaning and deburring. On the whole, however, the robot industry continues to believe in its growth and Engineer B. Knoerr, of the MHI ("Assembly, Handling, Industrial Robots") Trade Association in the VDMA (Association of German Machine-Building and Installation Construction) even expressed this opinion: "The forecasts have even been topped." By the end of 1984, he predicts 6,000 industrial robots in the FRG. That would then be exactly as much as in Japan in 1980.

The output value of the entire MHI branch last year came to DM2.1 billion which had been earned by 16,000 workers. Out of a total of 100 firms active in this field, however, only 22-25 are robot makers who produce 2,000 units worth DM350 million last year. This sum includes the controls as well as the more immediate peripheral units, for example, claws or screwed-on tools.

As generally customary in the trend-setting machine-building industry, the export rate for this branch, which has a great future ahead of it, is 35-50 percent. On the other hand, 40 percent of the robots used in the FRG are imported; 32 percent come from Scandinavia and the United States but only 8 percent come from Japan (see report on page 15 [of original]).

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MICROELECTRONICS

FRG ESPRIT PARTICIPATION HINGES ON YEARLY FUNDING LIMIT

Rotterdam NRC HANDELSBLAD in Dutch 24 Jan 84 p 15

/Article by Wynold Verwey: "Bonn Makes New Demands on Esprit"/

> /Text/ Brussels, 24 Jan--West Germany has set a new condition before it will be ready to agree to the financing of Esprit, the EC program for cooperation in the area of information technology. The ministers of technology and science will venture a new attempt on 28 February.

Apparently, the ministers of foreign affairs made progress yesterday with the dossier. Originally, the West German delegation objected to entering upon long-term (5 years) financial responsibilities as long as the general financial structure of the EC has not been put in order. Bonn has now dropped that objection, but at the same time has proposed that a green light only be given when the expenditures for the Community's entire research program are set at a limit.

Besides Esprit, the research program consists of JET (cooperation in the area of atomic fusion) and the Community Center for Research. West Germany wants no more than 600 million ecu (1.5 billion guilders) to be spent on the entire package--thus including Esprit--each year. Spread over 5 years, Esprit would thus cost approximately 3.5 billion guilders. The EC would account for half of this, and the rest would be on the shoulders of the 12 participating technological firms. On balance, the German proposal means that other projects would have to be cut back, if Esprit is to continue in its present form.

The British, who are also opposed to the approval of the Esprit program, have the point of view that Esprit cannot be financed without solving the EC's general budget problems.

The new delay may result in a dampening of the initial enthusiasm for Esprit among a number of specific firms active in information technology. Esprit is intended to promote cooperation among EC firms, whereby competition from Japan and the United States can better be dealt with.

12271
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UPDATE ON FRENCH ELECTRONICS INDUSTRY PROGRAM

Paris ZERO UN INFORMATIQUE in French Jan 84 pp 32-33

[Unsigned article: "When PAFE Loses a Building Block"]

[Text] PAFE (Action Program for the Electronics Industry) has recently been the subject of a number of news releases from the Ministry of Research and Industry, among which an update of the national research and development projects.

The publication of these projects disclosed that the project "Building Blocks for Minis and Micros in 1985/1986" had been abandoned, without any explanation either from the ministry, from DIELI (Directorate of the Electronics Industries and Data Processing), or from PAFE's new "wet nurse," DGT (General Directorate of Telecommunications). One would however like to know more about it, since there is still talk of a scientific computer like CNET's (National Center for Telecommunications Studies) SM 90, a thought which is not misplaced but rather restricting.

According to their promoters, these projects were chosen in areas in which "the know-how of French specialists could be fully utilized." Hence this action. DESTI (Directorate of Scientific and Technical Development and Innovation) supervised their definition, and six national projects were ultimately retained, devoted to the following topics:

Computer for scientific and industrial utilization (SM 90);
Computer aided design of very large scale integrated circuits (CAD/VLSI);
Software engineering;
Computer aided design and manufacturing (CAD/CAM);
Computer aided translation (CAT);
Displays.

Building Block Pileup

These national projects are part of a policy of research and development aimed at:

Increasing the overall research effort according to the priority assigned by the government to the industry;

Orienting the action of public laboratories while keeping in mind industrial priorities and scientific evolution;

Improving the efficiency of collaboration among public and industrial laboratories, as well as research/industry transfers.

In 1983, this research activity commanded a budget of 1350 million francs, which will be raised to 1550 million. This public action is complemented by an endowment of incentive credits which will reach 750 million francs in 1984, combining funds from DESTI, the Agency for Computer Technology, ANVAR (National Agency for Implementation of Research), DIELI, DGT, and the General Delegation for Weapons (DGA). Altogether, during the next four years, the six projects will add up to a research and development investment of the order of 1 billion francs, whose financing will be shared among the government and the industries involved. It should be noted that in 1983, DIELI, DGA, and DGT have already devoted nearly 6 billion francs to electronics research and development.

Associated in Action for the Better?

The major public research centers involved in the electronics industry are CNRS (National Center for Scientific Research) and university laboratories, as well as INRIA (National Institute for Research in Data Processing), CNET, and AEC. They are associated in a certain number of actions generated by the national projects. Each of them is involved in several actions, some of which are still being studied and will be disclosed in the next few months. The following actions have already been implemented:

Creation of a public interest group (GIP) composed of CNET, Bull-Sems, and INRIA, to produce a computer processing work station based on CNET's SM 90;

Production of a VLSI (100,000 to 1 million transistors) design system based on new methods known as "hierarchical," by a GIP composed of Thomson CSF, Bull, INRIA, and University of Grenoble's Imag. This operation is included in the CAD/VLSI project;

Creation of a GIE (economic interest group) with Syseca, Eurosoft, and Bull, to produce so-called "user friendly" software for the Software Engineering national project, with the collaboration of CAP-Sogeti for transaction with Multipro;

Design of a system for graphics and image processing by an industrial consortium headed by CSEE (Electric Signals and Enterprises Company) with the collaboration of a users' group assembled by CIGREF (Information Processing Group of Large French Enterprises);

Industrialization of an automated translation system, by a consortium composed of SG2, Copernique, and Sonovision, supported by Avions Marcel Dassault, and based on the work of Geta at the University of Grenoble;

Development of a module for automatic vision and robot and machine control, by a consortium consisting of Matra, Midi Robots, and Itmi, with the participation of PSA, LAAS (Laboratory for Automation and Systems Analysis, Toulouse), and Imag (Grenoble);

And lastly, design of a system for direct command of robots integrated into CAD systems, assigned to Dassault Systemes and LAM (Montpellier Automation Laboratory). This operation, as well as the two preceding ones, are part of the CAD/CAM national project.

There is cause to hope that these associations, which like marriages are formed for better or for worse, will end up with the first alternative. But where did the Sirius and other Sol projects end up? In the still very recent shadows of oblivion?

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MICROELECTRONICS

FRENCH DRY-ETCH EQUIPMENT FOR ELECTRONICS PRODUCTION

Paris L'USINE NOUVELLE in French 5 Jan 84 p 58

[Article by Herve Rolland and Laurent Renault]

[Excerpts] Needed to produce the circuits of the future, with its increasingly finer resolution, dry-etching will supersede the less precise chemical etching.

Last November, in Grenoble, the meeting organized by the French Vacuum Society on the topic of dry-etching in microelectronics, allowed 250 specialists to discuss this technique, which is indispensable for the industrial production of integrated circuits and highly integrated memories, and which is upstream of microphotolithography. The meeting also provided an opportunity to show that French research and industry are once more of world caliber in this domain, and that the transition to VLSI (very large scale integration) could be the opportunity for establishing a European industry for chip-making machines, and thus for recovering part of the European lag in the fabrication of integrated circuits.

Absent from the microlithography market, France is nevertheless present on the dry-etch one. The Annecy plant of CIT-Alcatel has designed two machines around the process perfected at LETI (Electronics and Data Processing Technology Laboratory) in Grenoble. The first, GIR 200, is a production machine capable of processing 40 100-mm silicon wafers per hour; it costs about one million francs, and 30 of them have been built (and sold) so far, with several of them going to Japan. The GIR 100, a bottom-of-the-line machine, is produced at the rate of two per month. A new mid-line machine should see the light of day in mid-1984.

These different machines are modular, and fabrication processes are transferrable among them. Another French enterprise, Nanotec SA, founded by a former LETI researcher, provides counsel in the dry-etch field, a technology that is still very new.

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BULL TO PRODUCE COMPUTERS IN BRAZIL FOR THIRD-WORLD MARKET

Paris L'USINE NOUVELLE in French 19 Jan 84 p 45

[Article by Daniel Solano: "Bull: The Brazilian Springboard"]

> [Text] Bull had been marketing its products there for already 20 years. Its agreement with the Brazilian group ABC will enable it to manufacture them on location and thus provide it a springboard to reach other developing countries.

By June 1984, the Bull DPS7-65 computer will be manufactured in Brazil. In spite of the economic problems which Brazil is experiencing now, Bull is thus strengthening its position on one of the largest markets in the developing world (Brazil is the 11th country worldwide for the value of the computers it owns). And the terms of this agreement could be used as a reference by other third-world countries in which Bull wants to expand its operations.

Bull has been operating in Brazil for over 20 years: its local subsidiary was created in May 1960 to market imported computers. The Brazilian computer market has recently experienced a strong growth and the country's computers as a whole are now worth over 2 billion dollars. After 1975, Bull's strategy consisted in trying to invest locally, as IBM and Burroughs had already done. Dependence on imports appeared risky in a country which had problems with its foreign balance of payments. And Brazilian authorities wanted to create a Brazilian computer industry. The mini and micro-computer sectors were then "reserved" for Brazilian manufacturers, and foreign companies had to be content with other subsectors, which still account for 65 percent of the value of all of Brazil's computers.

To manufacture in Brazil today, a company must have a local partner. Therefore, Bull entered into a partnership with the ABC group which, among other things, is involved in electronics and telecommunications. In 1982, the all-powerful Special Secretariat to Data Processing (SEI) gave its approval late in 1983 [as published]. A joint company was formed: ABC-Empresa Telematic SA, whose stock is held 60 percent by ABC and 40 percent by Bull's Brazilian subsidiary.

New Third-World Markets

The agreements signed provide for cooperation between the two partners. The DPS7-65 computer will be manufactured in a plant belonging to the ABC group,

located at Contagem, in the state of Minas Gerais. The operation will involve a transfer of technology and as many components as possible will be manufactured on location.

For Bull, the stakes are high. The local subsidiary holds 10 percent of the middle and top-of-the-line computer market. The partnership with ABC should make it possible to consolidate and increase that share of the market, in spite of strong competition from U.S. companies (IBM has been manufacturing in Brazil since 1939!). Now, the Brazilian market potential is far from being exhausted and the sector has been relatively spared by the crisis: for instance, Bull's sales in Brazil increased by 15 percent in 1983.

This operation will also make it possible to take advantage of the incentives which the Brazilian government--which is eager to get foreign currency--is offering to exporting companies. Therefore, the objective is to use Brazil as a springboard to reach other countries in the region, especially Argentine, Chile and Uruguay. Finally, Brazil is the first instance of the cooperation policy which Bull wants to implement with developing countries.

Similar projects are being negotiated with several countries. Of course, in the field of data processing, large contracts are concentrated in industrialized countries. Yet, new markets are emerging in the third world. Undeniably, there is room for expansion.

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SCIENTIFIC AND INDUSTRIAL POLICY

DUTCH, U.S. FIRMS FORM JOINT VENTURE FOR LASER RESEARCH

Rotterdam NRC HANDELSBLAD in Dutch 26 Jan 84 p 12

/Article: "Dutch Venture with Americans in Laser Technology"/

/Text/ Eindhoven, 26 Jan--PMB Engineering and Developing in Eindhoven, a daughter enterprise of the PMB machine plant, has reached an agreement in principle with the American firm, Control Laser, for the initiation of a joint venture. The joint undertaking will be concerned with the production, development and sale of laser systems for Europe, excluding Great Britain, where Control Laser has its own subsidiary enterprise. The American firm is the third largest producer of lasers in the world.

According to Director H. Dokter of PMB Engineering and Developing, Control Laser will provide the know-how in the area of lasers. PMB itself has the necessary inhouse knowledge of systems management, and TH Twente will help with information with the deportment of materials during laser operations.

It is intended that Control Laser have an interest of 45 percent in the joint venture. According to Director J. Poutsma, the majority of shares will be in Dutch hands. An amount of approximately 2 million guilders is necessary for the initiation of the venture, in part in order to acquire machinery, to se up a laboratory and to get sales activities off the ground.

Talks are still under way with banks and other financial backers concerning financing. It is expected that the joint venture will become operational in the second half of the year. The new venture will concern itself with research on the technical and economic feasibility of laser applications, and will in addition supply complete laser systems and carry out further production work in small series for companies that cannot afford a laser of their own.

In the initial phase, the venture will get its lasers from Control Laser, but the aim is to eventually produce lasers on their own. According to PMB Director Poutsma, industrial use of laser systems, which is soaring in the United States, is still in its infancy in Europe. He points out the great benefits and possibilities of laser systems and predicts a yearly growth in the European market of a sure 30 percent. According to Poutsma, the total European market will be good for a turnover of approximately 200 million guilders within several years.

The new joint venture hopes to claim a respectable share of this, but short-term expectations are not running as high. A turnover of approximately 2 million guilders is being counted on for the first year.

According to Director Dokter, the new venture is aiming especially at the aircraft industry (Fokker), the metallurgical industry, the computer industry and the synthetics industry. Some 200 people work for PMB, where among other things a third generation of robots for the cigar industry is being produced. Engineering and Developing employs 16 people. According to Director Poutsma, the initiation of the joint venture can result in an expansion of personnel by several dozen employees.

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BRIEFS

BERLIN TECHNOLOGY PROMOTION CENTER--The Senate of Berlin and the Berlin TU (Technical University) on 30 November opened the "Berlin Innovation and Venture Capital Center" for the promotion of the establishment of technology-oriented enterprises in direct cooperation with the TU. The first installation of this kind in the FRG intends to provide consultation, cooperation opportunities, as well as technical and personnel assistance to young technology enterprises, such as they are being founded mostly by scientists. For the time being, around 35 jobs are being created here and an increase to 800-1000 is expected over the next 2 years. Plans call for widely differing products, an enterprise is developing and making robots for pallettization, and in 2 years there are to be at least ten employees, while a second enterprise is making specialized electronics instruments for mining. TU President Professor Dr Juergen Starnick wants to get a new way of thinking started with the help of the venture capital center. The students are no longer to ask already for their retirement benefits after they have finished their studies and examinations and as they accept their first job; instead, they are to become young entrepreneurs because they prefer to do something themselves, rather than being only a cog in a big machine. In the opinion of Berlin Science and Research Senator Professor Dr Wilhelm A. Kewenig, the selected location is a particularly happy choice because the old AEG [General Electric Company] building, which has been put to new use, expresses the tie-in with the good Berlin tradition of close cooperation between science and industry. Kewenig called the center an "enterprise maternity ward" and hopes that the babies from Berlin's Acker Street will thrive nicely. [Text] [Duesseldorf VDI NACHRICHTEN in German 16 Dec 83 p 1] 5058

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